UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

WASTE UTILIZATION (ACRE)

CODE 633

DEFINITION

Using agricultural wastes such as manure and wastewater or other organic residues.

PURPOSE

This practice is applied as part of a total resource management system to:

- Protect water quality.
- Protect air quality.
- Provide fertility for crop, forage, fiber production, and forest products.
- Improve or maintain soil structure.
- Provide feedstock for livestock.
- Provide a source of energy.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where agricultural wastes including animal manure and contaminated water from livestock and poultry operations; solids and wastewater from municipal treatment plants; and agricultural processing residues are generated, and/or utilized.

CRITERIA

General Criteria Applicable to All Purposes.

All federal, state, and local laws, rules, and regulations governing waste management, pollution abatement, health and safety shall be strictly adhered to. The owner or operator shall be responsible for securing all required permits or approvals related to waste utilization and for operating and maintaining any components in accordance with applicable laws and regulations.

Use of agricultural wastes shall be based on at least one analysis of the material during the time it is to be used. In the case of daily spreading, the waste shall be sampled and analyzed at least once each year. As a minimum, the waste analysis should identify nutrient and specific ion concentrations. Where the metal content of municipal wastewater, sludge, septage, and other agricultural waste is of a concern, the analysis shall also include determining the concentration of metals in the material.

When agricultural wastes are land applied, application rates shall be consistent with the requirements of the NRCS conservation practice standard for nutrient management (590).

Where agricultural wastes are to be spread on land not owned or controlled by the producer, the waste management plan, as a minimum, shall document the amount of waste to be transferred and who will be responsible for the environmentally acceptable use of the waste.

Records of the use of wastes shall be kept a minimum of five years as discussed in OPERATION AND MAINTENANCE, below.

Organic nutrient application to land must comply with the most restrictive of federal, state, or county laws, ordinances and permit conditions. Montana Water Quality Act, Section 75-5-605 (revised 1991) states that "It is unlawful to…cause pollution…of any state waters or to place or cause to be placed any wastes in a location where they are likely to cause pollution of any state waters." Refer to the Montana Supplement of the Agricultural Waste Management Field Handbook, Part 651, Chapter 1, for a listing of pertinent state laws and regulations regarding agricultural wastes.

Additional Criteria to Protect Water Quality

All agricultural waste shall be utilized in a manner that minimizes the opportunity for contamination of surface and ground water supplies.

Agricultural waste shall not be land-applied on soils that are frequently flooded, as defined by the National Cooperative Soil Survey, during the period when flooding is expected.

When liquid wastes are applied, the application rate shall not exceed the infiltration rate of the soil and the amount of waste applied shall not exceed the moisture holding capacity of the soil profile at the time of application. Wastes shall not be applied to frozen, snow-covered, or saturated soil if the potential risk for runoff exists. The

Note: This type of font **(AaBbCcDdEe 123…)** indicates NRCS National Standards.
This type of font (AaBbCcDdEe 123…) indicates Montana Supplement.

basis for the decision to apply waste under these conditions shall be documented in the waste management plan.

Additional Criteria to Protect Air Quality

Incorporate surface applications of solid forms of manure or other organic by-products into the soil within 24 hours of application to minimize emissions and to reduce odors**.**

When applying liquid forms of manure with irrigation equipment select application conditions where there is high humidity, little/no wind blowing, a forthcoming rainfall event, and/or other conditions that will minimize volatilization losses into the atmosphere. The basis for applying manure under these conditions shall be documented in the nutrient management plan.

Handle and apply poultry litter or other dry types of animal manure or other organic by-products when weather conditions are calm and there is less potential for blowing and emission of particulates in the atmosphere. The basis for applying manure under these conditions shall be documented in the nutrient management plan.

When sub-surface applied using an injection system, waste shall be placed at a depth and applied at a rate that minimizes leaks onto the soil surface, while minimizing disturbance to the soil surface and plant community.

All materials shall be handled in a manner to minimize the generation of particulate matter, odors, and greenhouse gases.

Additional Criteria for Providing Fertility for Crop, Forage and Fiber Production and Forest Products

Where agricultural wastes are utilized to provide fertility for crop, forage, fiber production, and forest products the practice standard Nutrient Management (590) shall be followed.

Application of organic waste containing high amounts of heavy metals can exceed the adsorptive capacity of the soil and increase the potential for ground water or aquifer contamination. Where municipal wastewater and solids are applied to agricultural lands as a nutrient source, the single application or lifetime limits of heavy metals shall not be exceeded. The concentration of salts shall not exceed the level that will impair seed germination or plant growth. **Sandy soils with low organic matter and low pH have a low potential for retention of heavy metals. These soils have the highest potential for heavy metal and trace element contamination of ground water. TABLE 1– Recommended Soil Test Limits of Metals, identifies the recommended cumulative limits for metals of major concern by EPA when wastes are applied to agricultural land.**

TABLE 1. Recommended Soil Test Limits of Metals*

METAL	--SOIL CATION EXCHANGE CAPACITY, MEQ/100G -- <5	5 to 15	>15
	---------- LB./AC ----------		
Pb	500	1,000	2,000
Zn	250	500	1,000
Ni	125	250	500
Cd	4.4	8.9	17.8

*USEPA 1983, taken from AWMFH, 04/92.

Additional Criteria for Improving or Maintaining Soil Structure

Wastes shall be applied at rates not to exceed the crop nutrient requirements or salt concentrations as stated above.

Residue management practices shall be used for maintenance of soil structure.

Additional Criteria for Providing Feedstock for Livestock

Agricultural wastes to be used for feedstock shall be handled in a manner to minimize contamination and preserve its feed value. Chicken litter stored for this purpose shall be covered. A qualified animal nutritionist shall develop rations that utilize wastes.

Additional Criteria for Providing a Source of Energy

Use of agricultural waste for energy production shall be an integral part of the overall waste management system.

All energy producing components of the system shall be included in the waste management plan and provisions for utilization of residues of energy production identified.

Where the residues of energy production are to be land-applied for crop nutrient use or soil conditioning, the criteria listed above shall apply.

CONSIDERATIONS

The effect of Waste Utilization on the water budget should be considered, particularly where a shallow ground water table is present or in areas prone to runoff. Limit waste application to the volume of liquid that can be stored in the root zone.

Agricultural wastes contain pathogens and other disease-causing organisms. Wastes should be utilized in a manner that minimizes their disease potential.

Priority areas for land application of wastes should be on gentle slopes located as far as possible from waterways. When wastes are applied on more sloping land or land adjacent to waterways, other conservation practices should be installed to reduce the potential for offsite transport of waste.

It is preferable to apply wastes on pastures and hayland soon after cutting or grazing before re-growth has occurred.

Minimize environmental impact of land-applied waste by limiting the quantity of waste applied to the rates determined using the practice standard Nutrient Management (590) for all waste utilization.

Consider the net effect of waste utilization on greenhouse gas emissions and carbon sequestration.

Organic nutrients tested at different times of the year may vary in nutrient content due to changes in bedding, feed, amounts of water entering a storage facility, or degradation. Initially, conduct multiple within-year analyses if season of application will occur within a year.

Waste sample analysis should identify nutrient and specific ion concentrations. Samples should be analyzed for pounds per ton or pounds per 1000 gallons of Total Nitrogen (N), Phosphorus (P_2O_5), and Potassium (K_2O). Where the metal content of municipal wastewater, sludge, septage, and other agricultural waste is of a concern, the analysis shall also include determining the concentration of metals in the materials.

When analyses are not available, use published average nutrient content values for planning and informational purposes only to initially establish total quantity of manure, or to estimate total nutrients in manure for certain time periods. Refer to TABLE 2. Daily Manure Production (as excreted)

PLANS AND SPECIFICATIONS

Plans and specifications for Waste Utilization shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. The waste management plan is to account for the utilization or other disposal of all animal wastes produced and all waste application areas shall be clearly indicated on a plan map.

Data shall be recorded on job sheets for nutrient management and waste utilization, including narrative statements in the conservation plan.

An agricultural waste utilization plan shall include the following:

1. **Location map - field numbers and a map or sketch of the area to be used.**
2. **Measured acres.**
3. **Date practice scheduled and applied.**
4. **A description of the size and kind of livestock present including quantity of organic materials produced.**
5. **A description of the manure storage and handling system including application equipment and labor needed to apply the organic nutrient source.**
6. **Identification of critical areas where special attention is required when applying organic wastes, including areas where nutrients will not be applied (e.g. waterways); areas where immediate incorporation or incorporation within 24-72 hours will be necessary; and where soil test P and K levels are high. Identify sinkholes, wells, high water table soils, frequently flooded soils, and other critical areas.**
7. **A schedule of application (MT-CPA-225) to include per acre annual rates, frequency of application (if applied more than once in the cropping year to the same field), anticipated month of application(s), time to incorporation after application, and amounts of N, P_2O_5 and K_2O available to plants at the prescribed rate.**
8. **Calculations and data used to develop the application schedule. This information includes calculations of the operation's organic nutrients available to the crop after application (MT-CPA-223, MT-CPA-227, MT-CPA-228).**
9. **Montana FOTG Form 590–Nutrient Management, MT-ECS-112, must be used when developing nutrient management plans in conjunction with waste utilization.Waste disposal including mass and concentration transported from farm.**
10. **All operation & maintenance activities.**

OPERATION AND MAINTENANCE

Records shall be kept for a period of five years or longer, and include when appropriate:

- Quantity of manure and other agricultural waste produced and their nutrient content.
- Soil test results, **manure sample analysis**.
- Dates and amounts of waste application where land applied and the dates and amounts of waste removed from the system due to feeding, energy production or export from the operation.
- Description of climatic conditions during waste application such as: time of day, temperature, humidity, wind speed, wind direction, and other factors as necessary.
- Waste application methods.
- Crops grown and yields (both yield goals and measured yield).
- Other tests such as determining the nutrient content of the harvested product.
- Calibration of application equipment.

The operation and maintenance plan shall include the dates of periodic inspections and maintenance of equipment and facilities used in waste utilization. The plan should include what is to be inspected or maintained, and a general time frame for making necessary repairs.

REFERENCES

USDA–Natural Resources Conservation Service, Field Office Technical Guide, Section IV, Practice Standard 590–Nutrient Management, March 2000.

USDA–Natural Resources Conservation Service, Field Office Technical Guide, Section IV, Practice Standard 393–Filter Strip, April 1999.

Using Whey on Agricultural Land—A disposal Alternative. 1981. University of Wisconsin Extension Publication A3098. USDA–Natural Resources Conservation Service, Agricultural Waste Management Field Handbook, Part 651. 1992.

Montana's Nondegradation Policy, Montana Department of Agriculture, Water Quality Division, Ground Water Section. 1991.

USDA–Natural Resources Conservation Service, Field Office Technical Guide, Section IV, Practice Standard 449–Irrigation Water management, March 1999.